AMBIENT AIR MONITORING DATA: APPROACHES, CONSIDERATIONS, LIMITATIONS, AND EVALUATION

Presented by:

David Brymer

&

Laurel Carlisle

Texas Natural Resource Conservation Commission

Ambient Air Monitoring Techniques

Non-Criteria Pollutants

- Volatile Organics
  - On-site determinations
    - TNMHC, FTIR, UV-DOAS, auto GC, portable GC
  - Field Collection with Lab Analysis
    - Canisters
    - Tedlar Bags
    - Solid Sorbents (multibed)
    - Reactive sorbents
      - DNPH for carbonyls
      - HBr tubes for ethylene/propylene oxides

Semi-Volatile Organics

- On-Site Determinations
  - Very limited
- Field Collection with Lab Analysis
  - Filter/PUF plugs for PAHs, dioxins/furans, PCBs, some pesticides
  - Solid sorbents

Particulate Matter

- PM_{10} or $PM_{2.5}$ gravimetric
- Metals
- Cations/anions and other speciated data

Data Uncertainty

- Data Quality Objectives vs. Reality
- Sampler Site Selection
  - What do the data represent?
- Unmeasured bias
  - Conversion efficiency, sampler recovery, sample media storage effects, breakthrough at elevated temperatures
- Interferences
  - Ozone, pH, inter-elemental interferences, water, CO_2
- Time-integrated samples
  - Is the 1-hour sample really representative of the entire hour?
- Concentration level of quality control checks
- Method detection limits
  - How realistic are they?

Data Validation

Why does it take so long when the analysis only takes an hour?

- Sample media quality control
- Sampling quality control
- Analytical quality control
- Electronic data review
- Final review procedure

Sample Media Quality Control

- Blanks
- Recovery checks

Sampling Quality Control

- Sampler recovery
- Duplicates/blanks
- Matrix spikes
- Flow rates/dates and times
- Sample integrity/custody checks

Analytical Quality Control

- Calibration, second source standard checks
- Tune checks
- System blanks, calibration verification, duplicates
- Internal standards/surrogates
- Review of peak identifications and integrations

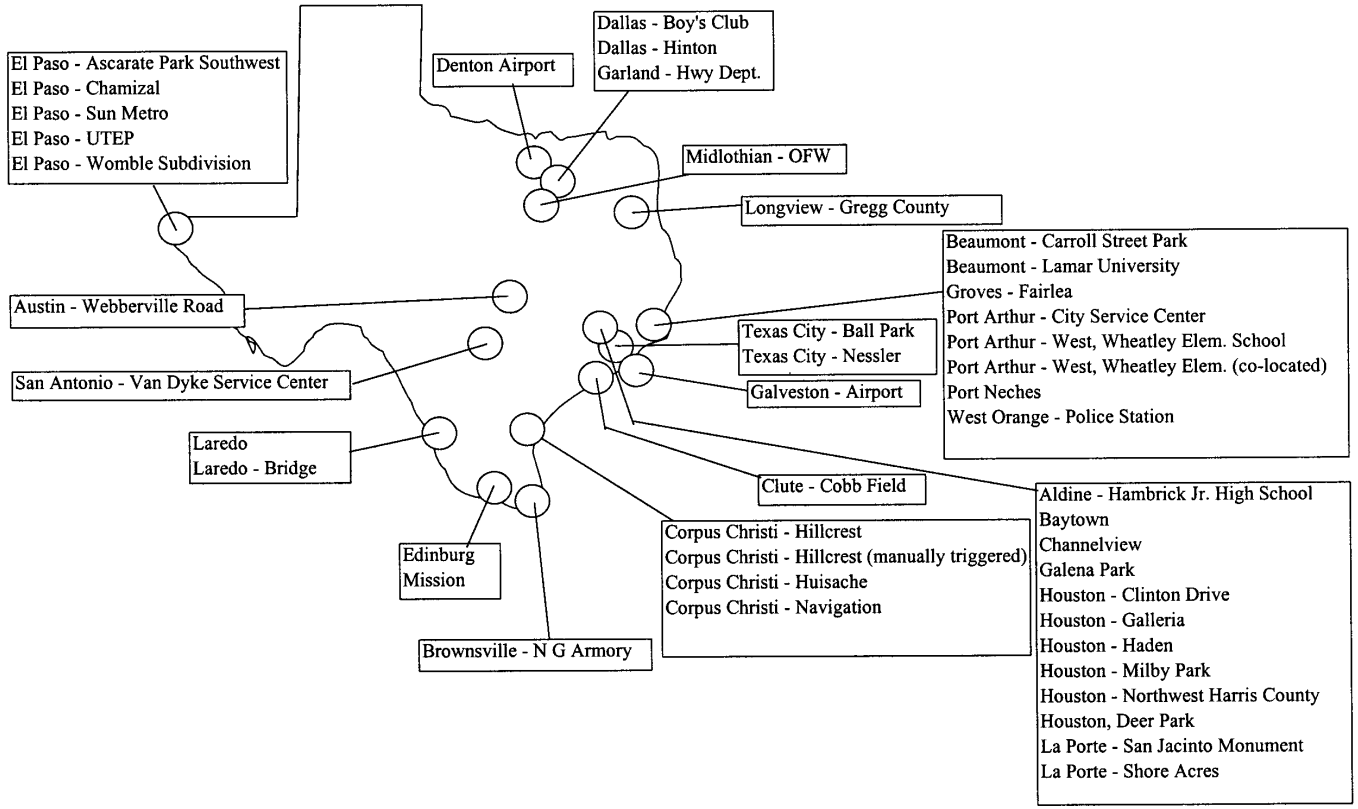
Electronic Data Review

- Accuracy check

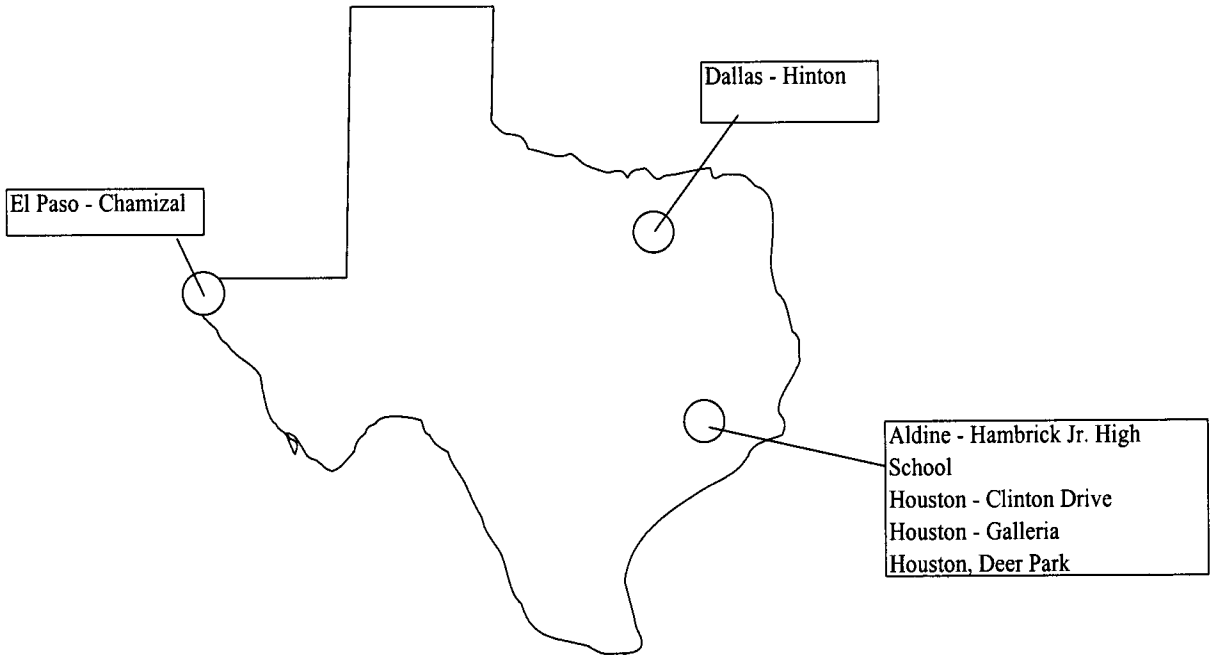
Final Review Procedure

- Identify anomalies
- Review all quality control data for sources of error
- Review any confirmatory data
- Review potential sources, wind direction, precipitation, operator notes
  - Gasoline, insecticide spraying, solvent use in monitoring station
- Identify needs for additional monitoring to define source OR confirm proper operation of instrumentation

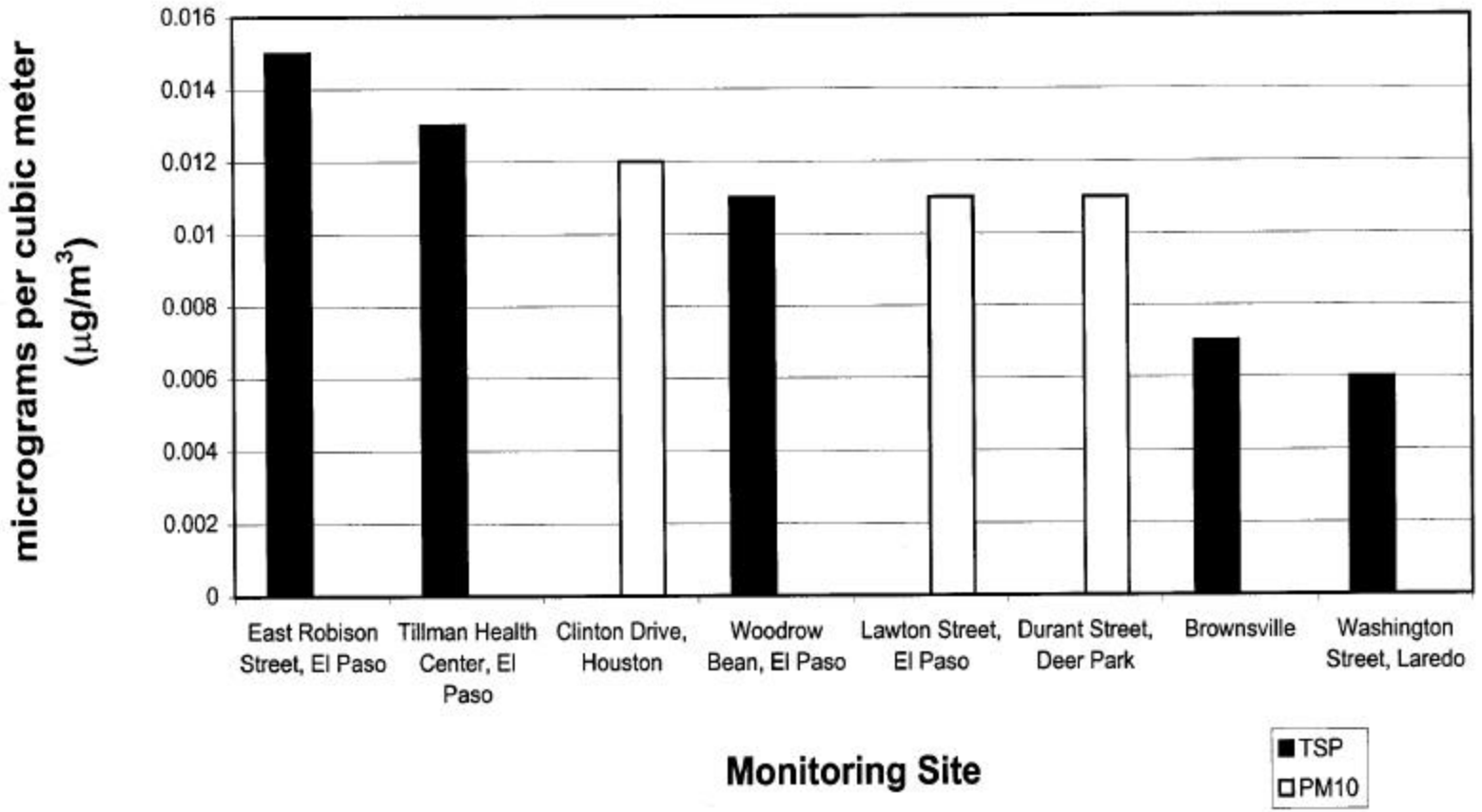
TNRCC Community Air Toxics Monitoring Network, 2000



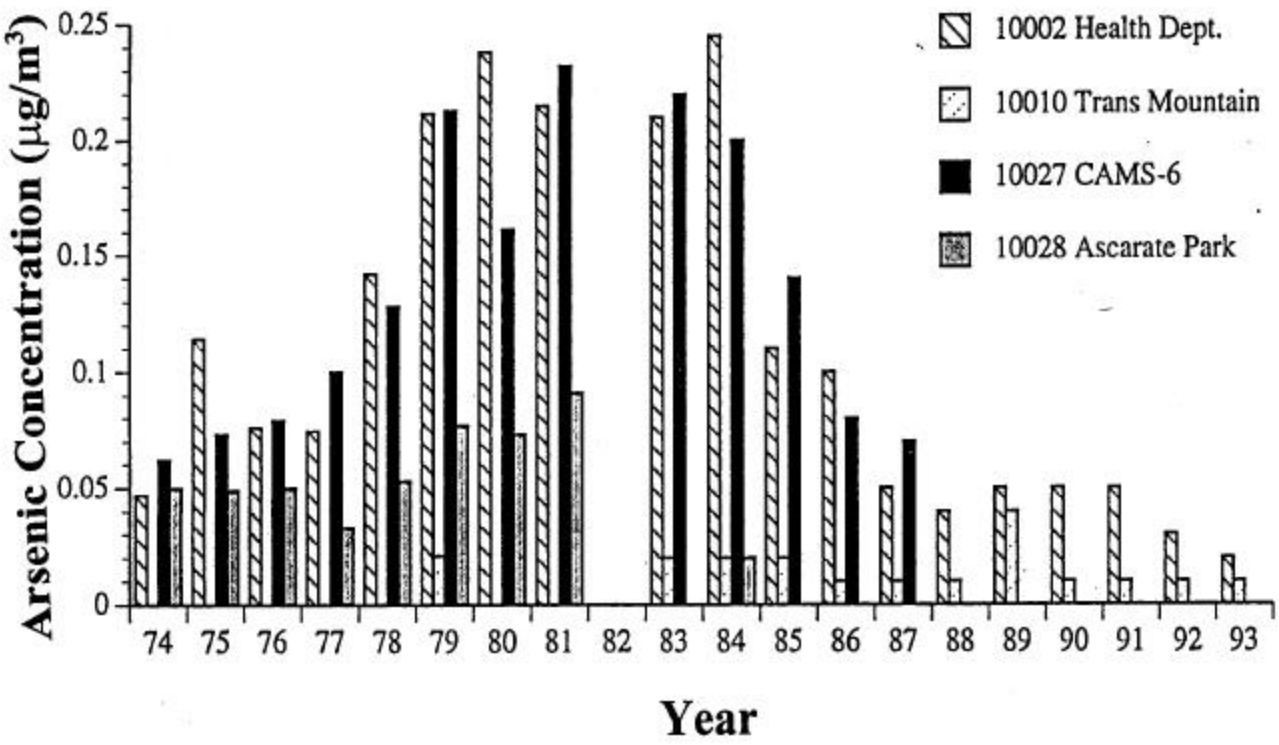
TNRCC Ambient Air Monitoring Network for Carbonyls, 2000



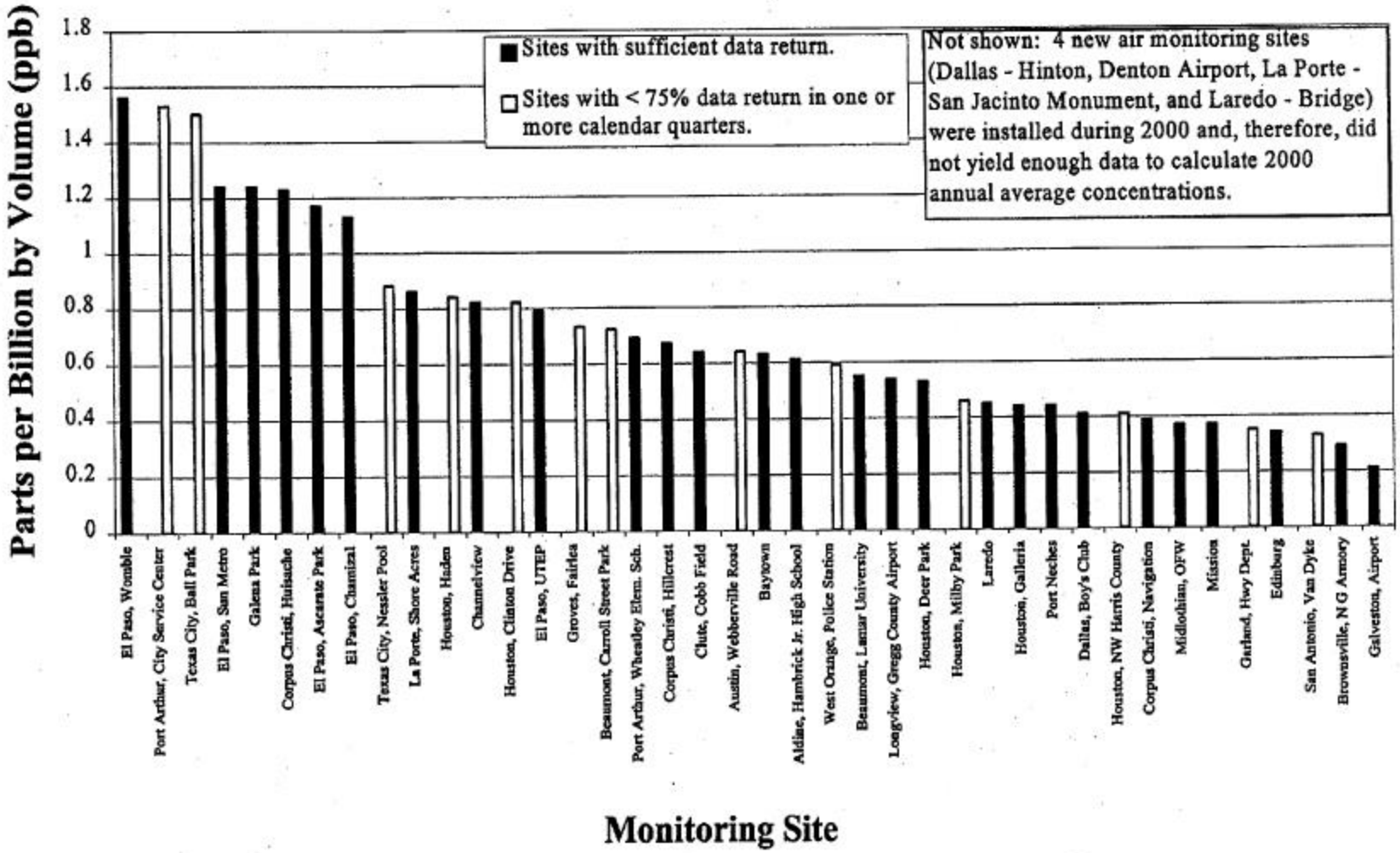
Annual Average Arsenic Levels in Texas 2000



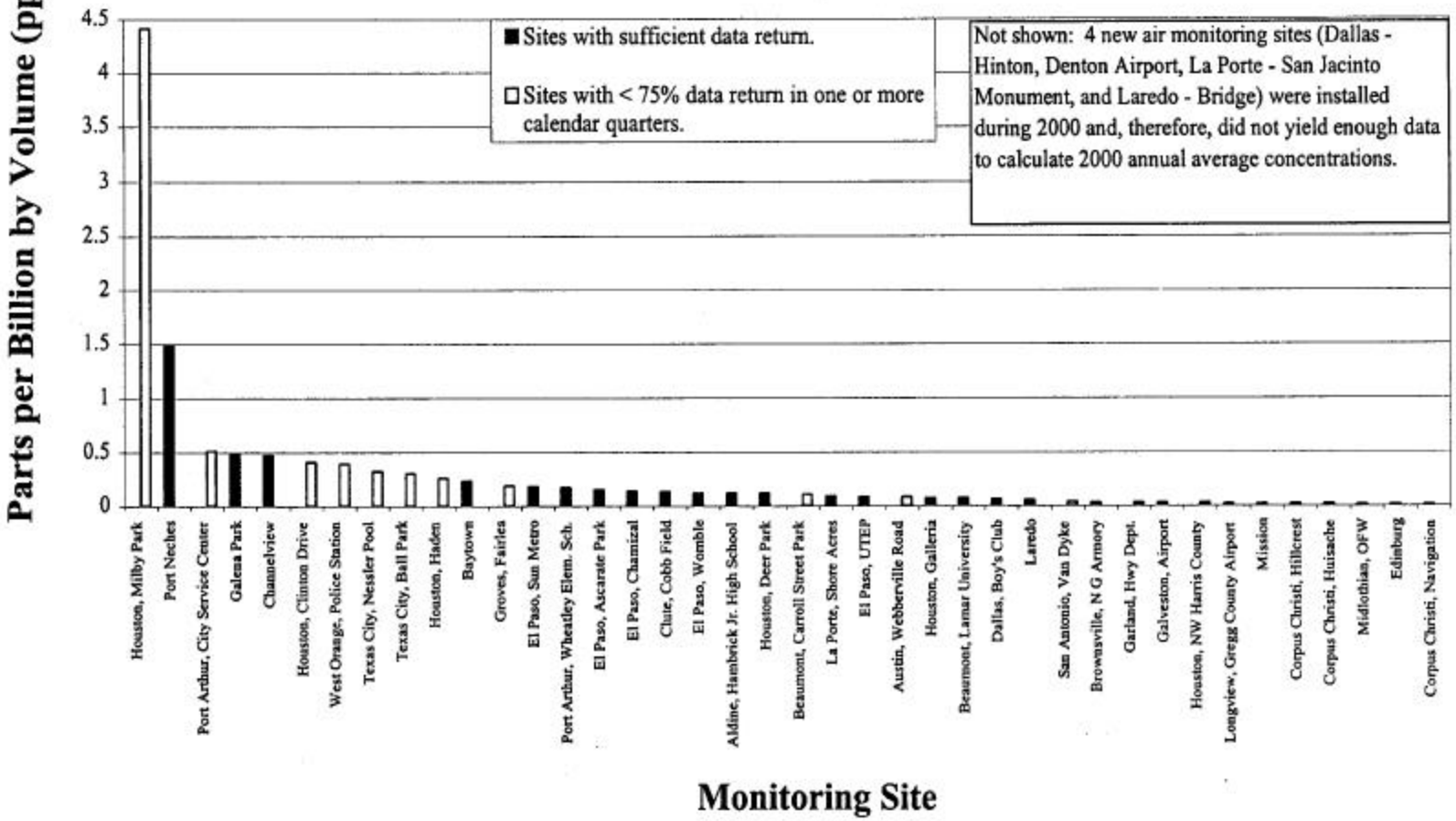
El Paso Annual Arsenic Data



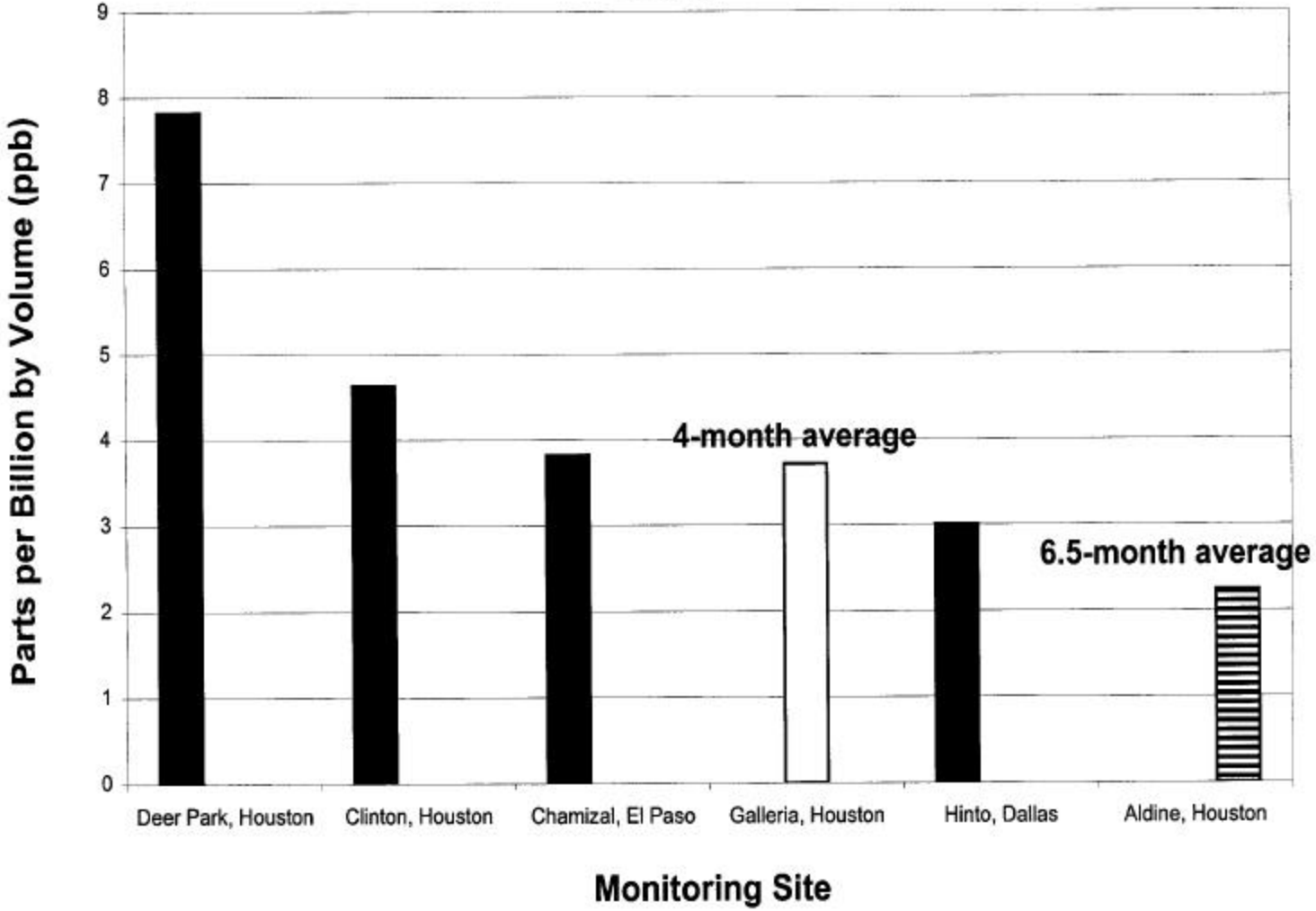
Annual Average Benzene Levels in Texas
TNRCC Community Air Toxics Monitoring Network



Annual Average 1,3-Butadiene Levels in Texas
TNRCC Community Air Toxics Monitoring Network



Annual Average Formaldehyde Levels in Texas 2000



What are Effects Screening Levels?

- Effects Screening Levels (ESLs) are compound-specific guideline air concentrations.
- ESLs are set at levels below which those reported in the scientific literature to result in an adverse health or welfare effect.

What are Effects Screening Levels?

- ESLs are set to protect sensitive members of the population:
  - The elderly
  - Children
  - The sick
  - Pregnant women

Deriving Effects Screening Levels

- Spectrum of effects considered:
  - Human Health Effects
    - Acute
    - Chronic
    - Nuisance
  - Effects on vegetation
  - Effects on material

Deriving Effects Screening Levels

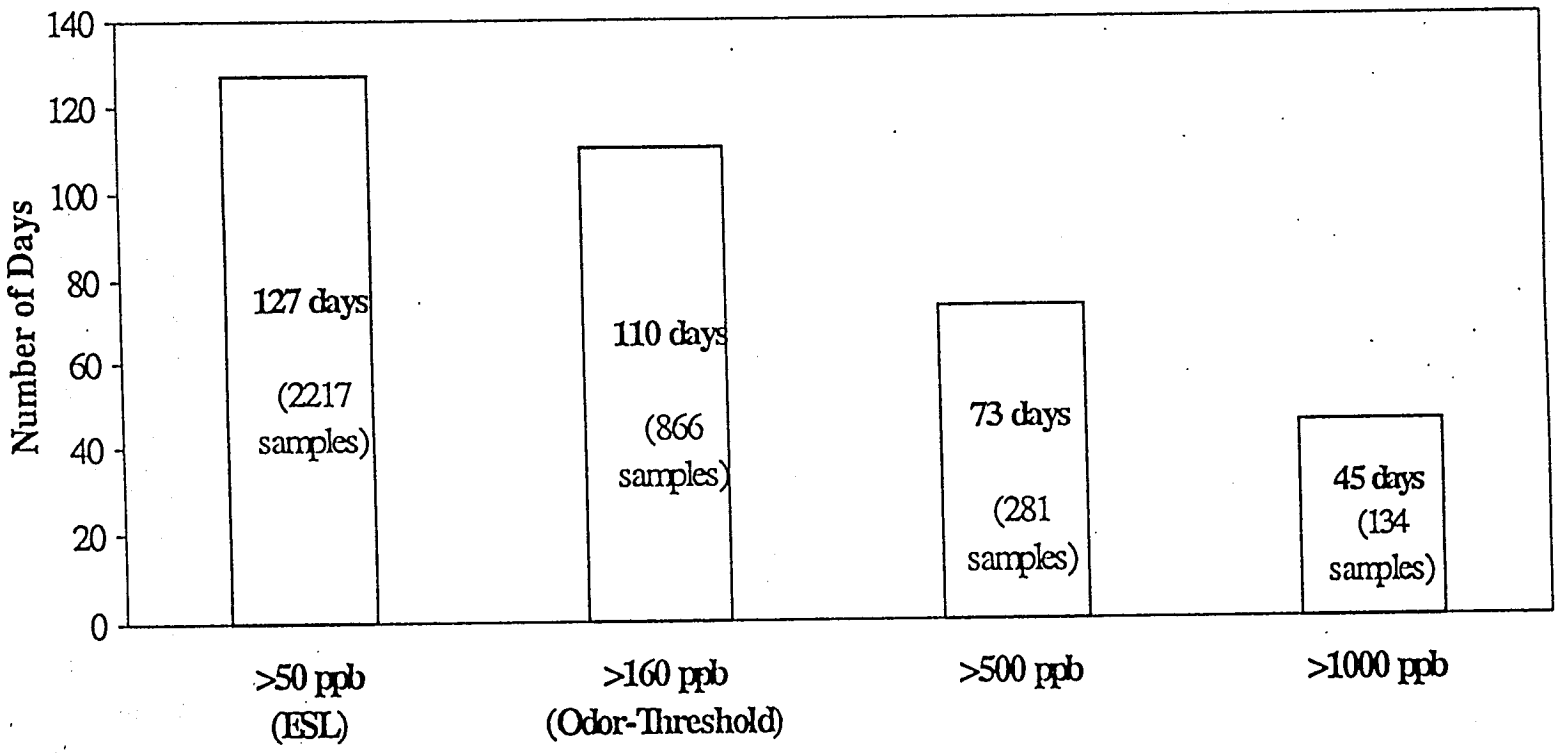
- Constituents tend to induce a spectrum of possible effects
- For example,
  - Low levels-odors
  - Intermediate levels-irritation
  - High levels-organ damage

  An ESL is set to protect against the effect occurring at the lowest concentration.

Case Study

- Network monitoring shows elevated benzene
- ESL review
- Mobile monitoring helps identify sources
- Facility specific fixed monitoring to aid in process management

Number of Days Elevated 1,3-Butadiene Fence-line Levels Reported 11/17/98 - 4/30/99



What We Have Learned

- Uncertainties associated with both modeling and monitoring
- Both needed to evaluate exposure
- Competing demands for limited monitoring resources
- Identify legal authority to correct problems once identified